Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (original): A solid oxide fuel cell for electrochemically reacting a fuel gas with an oxidant gas to produce a DC output voltage, said solid oxide fuel cell comprising:

a layer of ceramic ion conducting electrolyte defining first and second opposing surfaces;

a conductive anode layer positioned at the first surface of said electrolyte layer; and

a conductive cathode layer positioned at the second surface of said electrolyte layer;

wherein said electrolyte layer is disposed between said anode layer and said cathode layer;

wherein said conductive cathode layer comprises a copper-substituted ferrite perovskite material.

Claim 2 (currently amended): The fuel cell in accordance with claim 1 wherein copper is present in the perovskite material in an amount of at least 2 atomic percent, based on total amount of B-site atoms present in the perovskite material.

Claim 3 (currently amended): The fuel cell in accordance with claim 1 wherein said copper is present in the copper-substituted ferrite material in an amount of at least about 5 atomic percent, based on total amount of B-site atoms present in the copper-substituted ferrite material.

Claim 4 (original): The fuel cell in accordance with claim 1 wherein the material is a copper-substituted lanthanum ferrite perovskite material.

Claim 5 (original): The fuel cell in accordance with claim 4 wherein the material includes an A-site dopant selected from the group consisting of Mg, Ca, Sr, Ba, Pr, Nd, Sm and combinations thereof.

Claim 6 (original): The fuel cell in accordance with claim 5 wherein the A-site dopant is strontium.

Claim 7 (currently amended): The fuel cell in accordance with claim 5 wherein the A-site dopant is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 80 atomic percent, based on total amount of A-site atoms present in the copper-substituted lanthanum ferrite material, and copper is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 60 atomic percent, based on total amount of B-site atoms present in the copper-substituted lanthanum ferrite material.

Claim 8 (original): The fuel cell in accordance with claim 5 wherein the copper-substituted lanthanum ferrite material further comprises at least one B-site dopant selected from the group consisting of nickel, cobalt, manganese, aluminum and chromium.

Claim 9 (original): The fuel cell in accordance with claim 1 wherein the copper-substituted ferrite cathode exhibits a polarization resistance of from about 0.03 to about 0.50 Ωcm^2 at 650°C in air.

Claim 10 (original): The fuel cell in accordance with claim 1 wherein the copper-substituted ferrite cathode exhibits a polarization resistance of about 0.06 Ωcm^2 at 650°C in air.

Claim 11 (original): The fuel cell in accordance with claim 1 wherein the copper-substituted ferrite material is in contact with said electrolyte layer.

Claim 12 (original): The fuel cell in accordance with claim 1, further comprising an interlayer between said electrolyte layer and said cathode layer.

Claim 13 (original): The fuel cell in accordance with claim 1 wherein the copper-substituted ferrite material comprises a layer having a thickness of from about 1 to about 50 microns.

Claim 14 (original): The fuel cell in accordance with claim 1 wherein the copper-substituted ferrite material comprises a layer having a thickness of from about 1 to about 30 microns.

Claim 15 (original): The fuel cell in accordance with claim 1 wherein the copper-substituted ferrite material comprises essentially the entire cathode layer.

Claim 16 (original): The fuel cell in accordance with claim 1 wherein the copper-substituted ferrite material comprises at least about 25% of said cathode layer.

Claim 17 (original): The fuel cell in accordance with claim 1 wherein said cathode layer comprises a substantially homogenous mixture of a copper-substituted ferrite material and a finely-divided form of a second material.

Claim 18 (original): The fuel cell in accordance with claim 1 wherein said cathode layer comprises a perovskite composition having the formula:

$$La_{1-x-x'}Sr_xA'_{x'}Cu_yB'_{y'}Fe_{1-y-y'}O_3$$

wherein x is from about 0.05 to about 0.6; y is from about 0.05 to about 0.5; x' is from 0 to about 0.5; and y' is from 0 to about 0.4.

Claim 19 (original): The fuel cell in accordance with claim 1, further comprising at least one metallic interconnect.

Claim 20 (original): A solid oxide fuel cell assembly for electrochemically reacting a fuel gas with a flowing oxidant gas to produce a DC output voltage, said assembly comprising a plurality of integral fuel cell units, each unit comprising a layer of ceramic ion conducting electrolyte disposed between a conductive anode layer and a conductive cathode layer;

wherein the cathode layer of at least one of said fuel cells comprises a copper-substituted ferrite composition.

Claim 21 (currently amended): The fuel cell assembly in accordance with claim 20 wherein copper is present in the composition in an amount of at least about 2 atomic percent, based on total amount of B-site atoms present in the perovskite material.

Claim 22 (currently amended): The fuel cell assembly in accordance with claim 20 wherein said copper is present in the copper-substituted ferrite composition in an amount of at least about 5 atomic percent, based on total amount of B-site atoms present in the copper-substituted ferrite composition.

Claim 23 (original): The fuel cell assembly in accordance with claim 20 wherein the composition is a copper-substituted lanthanum ferrite perovskite material.

Claim 24 (original): The fuel cell assembly in accordance with claim 23 wherein the composition includes an A-site dopant selected from the group consisting of Mg, Ca, Sr, Ba, Pr, Nd, Sm and combinations thereof.

Claim 25 (original): The fuel cell assembly in accordance with claim 24 wherein the A-site dopant is strontium.

Claim 26 (currently amended): The fuel cell assembly in accordance with claim 24 wherein the A-site dopant is present in the copper-substituted lanthanum ferrite composition in an amount of from about 5 atomic percent to about 80 atomic percent, based on total amount of A-site atoms present in the copper-substituted lanthanum ferrite composition, and copper is present in the copper-substituted lanthanum ferrite composition in an amount of from about 5 atomic percent to about 60 atomic percent, based on total amount of B-site atoms present in the copper-substituted lanthanum ferrite composition.

Claim 27 (original): The fuel cell assembly in accordance with claim 24 wherein the copper-substituted lanthanum ferrite composition further comprises at least one B-site dopant selected from the group consisting of nickel, cobalt, manganese, aluminum, and chromium.

Claim 28 (original): The fuel cell assembly in accordance with claim 20 wherein the copper-substituted ferrite cathode exhibits a polarization resistance of from about 0.03 to about 0.50 Ωcm^2 at 650°C in air.

Claim 29 (original): The fuel cell assembly in accordance with claim 20 wherein the copper-substituted ferrite cathode exhibits a polarization resistance of about 0.06 Ωcm^2 at 650°C in air.

Claim 30 (original): The fuel cell assembly in accordance with claim 20 wherein the copper-substituted ferrite composition is in contact with said electrolyte layer.

Claim 31 (original): The fuel cell assembly in accordance with claim 20, further comprising an interlayer between said electrolyte layer and said cathode layer.

Claim 32 (original): The fuel cell assembly in accordance with claim 20 wherein the copper-substituted ferrite composition comprises a layer having a thickness of from about 1 to about 50 microns.

Claim 33 (original): The fuel cell assembly in accordance with claim 20 wherein the copper-substituted ferrite composition comprises a layer having a thickness of from about 1 to about 30 microns.

Claim 34 (original): The fuel cell assembly in accordance with claim 20 wherein the copper-substituted ferrite composition comprises essentially the entire cathode layer.

Claim 35 (original): The fuel cell assembly in accordance with claim 20 wherein the copper-substituted ferrite composition comprises at least about 25% of said cathode layer.

Claim 36 (original): The fuel cell assembly in accordance with claim 20 wherein said cathode layer comprises a substantially homogenous mixture of a copper-substituted ferrite composition and a finely-divided form of a second material.

Claim 37 (original): The fuel cell assembly in accordance with claim 20 wherein said cathode layer comprises a perovskite composition having the formula:

$$La_{1-x-x'}\ Sr_xA'_{x'}Cu_yB'_{y'}Fe_{1-y-y'}\ O_3$$

wherein x is from about 0.05 to about 0.6; y is from about 0.05 to about 0.5; x' is from 0 to about 0.5; and y' is from 0 to about 0.4.

Claim 38 (original): The fuel cell assembly in accordance with claim 20, further comprising:

a system for passing a gaseous fuel in contact with said anode layers and passing an oxidizing gas in contact with said cathode layers; and

a system for utilizing electrical energy produced by said fuel cells.

Claim 39 (original): The fuel cell assembly in accordance with claim 20, further comprising at least one metallic interconnect.

Claim 40 (original): A cathode for a solid oxide fuel cell, the cathode comprising a copper-substituted ferrite perovskite material.

Claim 41 (original): The cathode in accordance with claim 40 wherein copper is present in the perovskite material in an amount of at least about 2 atomic percent.

Claim 42 (original): The cathode in accordance with claim 40 wherein copper is present in the perovskite in an amount of at least about 5 atomic percent.

Claim 43 (original): The cathode in accordance with claim 40 wherein the material is a copper-substituted lanthanum ferrite perovskite material.

Claim 44 (original): The cathode in accordance with claim 43 wherein the material includes an A-site dopant selected from the group consisting of Mg, Ca, Sr, Ba, Pr, Nd, Sm and combinations thereof.

Claim 45 (original): The cathode in accordance with claim 44 wherein the A-site dopant is strontium.

Claim 46 (original): The cathode in accordance with claim 44 wherein the A-site dopant is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 80 atomic percent and copper is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 60 atomic percent.

Claim 47 (original): The cathode in accordance with claim 44 wherein the copper-substituted lanthanum ferrite material further comprises at least one B-site dopant selected from the group consisting of nickel, cobalt, manganese, aluminum, and chromium.

Claim 48 (original): The cathode in accordance with claim 40 wherein the copper-substituted ferrite cathode exhibits a polarization resistance of from about 0.03 to about 0.50 Ωcm^2 at 650°C in air.

Claim 49 (original): The cathode in accordance with claim 40 wherein the copper-substituted ferrite cathode exhibits a polarization resistance of about 0.06 Ωcm^2 at 650°C in air.

Claim 50 (original): The cathode in accordance with claim 40 wherein the copper-substituted ferrite material is in contact with an electrolyte layer.

Claim 51 (original): The cathode in accordance with claim 50, further comprising an interlayer between said electrolyte layer and said cathode layer.

Claim 52 (original): The cathode in accordance with claim 40 wherein the copper-substituted ferrite material comprises a layer having a thickness of from about 1 to about 50 microns.

Claim 53 (original): The cathode in accordance with claim 40 wherein the copper-substituted ferrite material comprises a layer having a thickness of from about 1 to about 30 microns.

Claim 54 (original): The cathode in accordance with claim 40 wherein the copper-substituted ferrite material comprises essentially the entire cathode.

Claim 55 (original): The cathode in accordance with claim 40 wherein the copper-substituted ferrite material comprises at least about 25% of said cathode.

Claim 56 (original): The cathode in accordance with claim 40 wherein said cathode comprises a substantially homogenous mixture of a copper-substituted ferrite material and a finely-divided form of a second material.

Claim 57 (original): The cathode in accordance with claim 40 wherein said cathode comprises a perovskite composition having the formula:

$$La_{1-x-x'}Sr_xA'_{x'}Cu_yB'_{y'}Fe_{1-y-y'}O_3$$

wherein x is from about 0.5 to about 0.6; y is from about 0.05 to about 0.5; x' is from 0 to about 0.5; and y' is from 0 to about 0.4.

Claim 58 (original): An oxygen reduction electrode for an electrochemical device, the electrode comprising a copper-substituted ferrite perovskite material.

Claim 59 (original): The electrode in accordance with claim 58 wherein copper is present in the copper-substituted ferrite material in an amount of at least about 2 atomic percent.

Claim 60 (original): The electrode in accordance with claim 58 wherein the electrochemical device is selected from the group consisting of a solid oxide fuel cell, an electrolyzer, an electrochemical pump and an electrochemical sensor.

Claim 61 (original): The electrode in accordance with claim 58 wherein copper is present in the perovskite material in an amount of at least about 2 atomic percent.

Claim 62 (original): The electrode in accordance with claim 58 wherein said copper is present in the copper-substituted ferrite material in an amount of at least about 5 atomic percent.

Claim 63 (original): The electrode in accordance with claim 58 wherein the material is a copper-substituted lanthanum ferrite perovskite material.

Claim 64 (original): The electrode in accordance with claim 63 wherein the material includes an A-site dopant selected from the group consisting of Mg, Ca, Sr, Ba, Pr, Nd, Sm and combinations thereof.

Claim 65 (original): The electrode in accordance with claim 64 wherein the A-site dopant is strontium.

Claim 66 (original): The electrode in accordance with claim 64 wherein the A-site dopant is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 80 atomic percent and copper is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 60 atomic percent.

Claim 67 (original): The electrode in accordance with claim 64 wherein the copper-substituted lanthanum ferrite material further comprises at least one B-site dopant selected from the group consisting of nickel, cobalt, manganese, aluminum and chromium.

Claim 68 (original): The electrode in accordance with claim 58 wherein the copper-substituted ferrite electrode exhibits a polarization resistance of from about 0.03 to about 0.50 Ωcm^2 at 650°C in air.

Claim 69 (original): The electrode in accordance with claim 58 wherein the copper-substituted ferrite electrode exhibits a polarization resistance of about 0.06 Ωcm^2 at 650°C in air.

Claim 70 (original): The electrode in accordance with claim 58 wherein the copper-substituted ferrite material comprises a layer having a thickness of from about 1 to about 50 microns.

Claim 71 (original): The electrode in accordance with claim 58 wherein the copper-substituted ferrite material comprises essentially the entire electrode.

Claim 72 (original): The electrode in accordance with claim 58 wherein the copper-substituted ferrite material comprises at least about 25% of said electrode.

Claim 73 (original): The electrode in accordance with claim 58 wherein said electrode comprises a substantially homogenous mixture of a copper-substituted ferrite material and a finely-divided form of a second material.

Claim 74 (original): The electrode in accordance with claim 58 wherein said electrode comprises a perovskite composition having the formula:

$$La_{1-x-x'}Sr_xA'_{x'}Cu_yB'_{y'}Fe_{1-y-y'}O_3$$

wherein x is from about 0.05 to about 0.6; y is from about 0.05 to about 0.5; x' is from 0 to about 0.5; and y' is from 0 to about 0.4.

Claim 75 (original): A method for producing electrical energy, comprising:

providing a solid oxide fuel cell, the solid oxide fuel cell including a layer of ceramic ion conducting electrolyte defining first and second opposing surfaces; a conductive anode layer positioned at the first surface of said electrolyte layer; and a conductive cathode layer positioned at the second surface of said electrolyte layer; wherein said electrolyte layer is disposed between said anode layer and said cathode layer; wherein said conductive cathode layer comprises a copper-substituted ferrite material;

causing air or other oxidizing gas to flow in contact with the cathode layer; and

causing a fuel gas to flow in contact with the anode layer to provide electrical energy.

Claim 76 (original): The method in accordance with claim 75 wherein copper is present in the copper-substituted lanthanum ferrite material in an amount of at least about 2 atomic percent.

Claim 77 (original): The method in accordance with claim 75, further comprising operating the fuel cell at a temperature of no greater than about 750°C.

Claim 78 (original): The method in accordance with claim 75 wherein the solid oxide fuel cell further comprises at least one metallic interconnect.

Claim 79 (original): A method for making an oxygen reduction electrode for an electrochemical device comprising:

providing a copper-substituted ferrite perovskite material; and

forming the copper-substituted ferrite perovskite material into an electrode for an electrochemical device.

Claim 80 (original): The method in accordance with claim 79 wherein copper is present in the copper-substituted ferrite material in an amount of at least about 2 atomic percent.

Claim 81 (original): The method in accordance with claim 79 wherein the electrochemical device is selected from the group consisting of a solid oxide fuel cell, an electrolyzer, an electrochemical pump and an electrochemical sensor.

Claim 82 (original): The method in accordance with claim 79 wherein copper is present in the perovskite material in an amount of at least about 2 atomic percent.

Claim 83 (original): The method in accordance with claim 79 wherein said copper is present in the copper-substituted ferrite material in an amount of at least about 5 atomic percent.

Claim 84 (original): The method in accordance with claim 79 wherein the material is a copper-substituted lanthanum ferrite perovskite material.

Claim 85 (original): The method in accordance with claim 84 wherein the material includes an A-site dopant selected from the group consisting of Mg, Ca, Sr, Ba, Pr, Nd, Sm and combinations thereof.

Claim 86 (original): The method in accordance with claim 85 wherein the A-site dopant is strontium.

Claim 87 (original): The method in accordance with claim 85 wherein the A-site dopant is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 80 atomic percent and copper is present in the copper-substituted lanthanum ferrite material in an amount of from about 5 atomic percent to about 60 atomic percent.

Claim 88 (original): The method in accordance with claim 85 wherein the copper-substituted lanthanum ferrite material further comprises at least one B-site dopant selected from the group consisting of nickel, cobalt, manganese, aluminum and chromium.

Claim 89 (original): The method in accordance with claim 79 wherein the copper-substituted ferrite electrode exhibits polarization resistance of from about 0.03 to about 0.50 Ωcm^2 at 650°C in air.

Claim 90 (original): The method in accordance with claim 79 wherein the copper-substituted ferrite electrode exhibits a polarization resistance of about 0.06 Ωcm^2 at 650°C in air.

Claim 91 (original): The method in accordance with claim 79 wherein the electrode comprises a layer having a thickness of from about 1 to about 50 microns.

Claim 92 (original): The method in accordance with claim 79 wherein the copper-substituted ferrite material comprises essentially the entire electrode.

Claim 93 (original): The method in accordance with claim 79 wherein the copper-substituted ferrite material comprises at least about 25% of said electrode.

Claim 94 (original): The method in accordance with claim 79 wherein said electrode comprises a substantially homogenous mixture of a copper-substituted ferrite material and a finely-divided form of a second material.

Claim 95 (original): The method in accordance with claim 79 wherein said electrode comprises a perovskite composition having the formula:

$$La_{1-x-x'}Sr_xA'_{x'}Cu_yB'_{y'}Fe_{1-y-y'}O_3$$

wherein x is from about 0.05 to about 0.6; y is from about 0.05 to about 0.5; x' is from 0 to about 0.5; and y' is from 0 to about 0.4.